Aerosol Measurements at the Casting Emissions Reduction Program (CERP) Foundry at McClellan Air Force Base, California

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The CERP pilot plant, located at the Mc Clellan AFB in Sacramento, California, is a full scale automotive type foundry designed to efficiently capture pollutant emissions from all aspects of foundry work analysis. CERP is charged with determining baseline gaseous and aerosol emissions for future reduction of foundry pollution. Aerosol measurements of mass and chemical species by size and time were conducted using 4 hr time averaging. The data showed excellent quality assurance in that the sum of the chemical species was highly correlated with, and closely approached, the value of, the gravimetric mass gain on the filters, and the species represented in the size-resolved samples approximated those in filter sampling. During the foundry operations, the $PM_{2.5}$ aerosol mass prior to the cleaning system was typically 700 to 900 $\mu g/m^3$ (the EPA proposed daily standard is 65 $\mu g/m^3$) which then requires an aerosol cleaning efficiency of 90% to 94%. Through use of time resolved sampling and the Berkeley Advanced Light Source Beam Line 10.3.1 synchrotron x-ray microprobe, time resolution was reduced from 4 hrs to 1 minute, allowing for the first time close correlation between *in situ* gaseous and particulate emissions, including trace elements. The $PM_{2.5}$ mass was dominated by alumino-silicates with manganese and iron enrichment. The important ultra-fine component ($D_p < 0.07$ μm) was only a few percent of the total $PM_{2.5}$ mass and had a high component of organic matter which represented 30% of reconstructed mass. Dramatic changes occurred in short time intervals, which will be tied to changes in foundry operations. Preliminary mass and compositional measurements with size and time resolution following the bag-house will be presented, showing that the effluent from the foundry is actually cleaner than the air entering the foundry from the surrounding neighborhood.

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